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MARTIAN POLAR RIFTS

By Dr. G. H. HAMILTON

LOWELL OBSERVATORY

IN 1902, Dr. Lowell published an extremely interesting article on the rifts in the north polar cap of Mars (*Popular Astronomy* for March, 1902). It is on account of this article that the present paper has its being.

Realizing that the oppositions of 1916, 1918 and 1920 had occurred at about the same Martian season as that viewed by Lowell—a study was made of drawings of the planet at these times. It is interesting to note that the observations not only confirm those of Lowell but add their weight to his conclusions.

It is purposed to chronicle the observations of the three last oppositions with deductions and show in what manner they agree with the conclusions arrived at by Dr. Lowell.

In 1916, the two drawings showing the region termed *Aeria* near the center of the disk and the north polar cap—those of March 4 and 9, in the cut—depict a rift in the cap, which seemingly the continuation of the canal *Cadmus*. That of March 9 also shows another rift to the north and west of the *Arethusa Lucus*. The season on Mars corresponded at that time to our May 24. The cap was in process of melting and the rifts were seemingly due to some underlying cause such as would hasten the melting of the polar snows at those points.

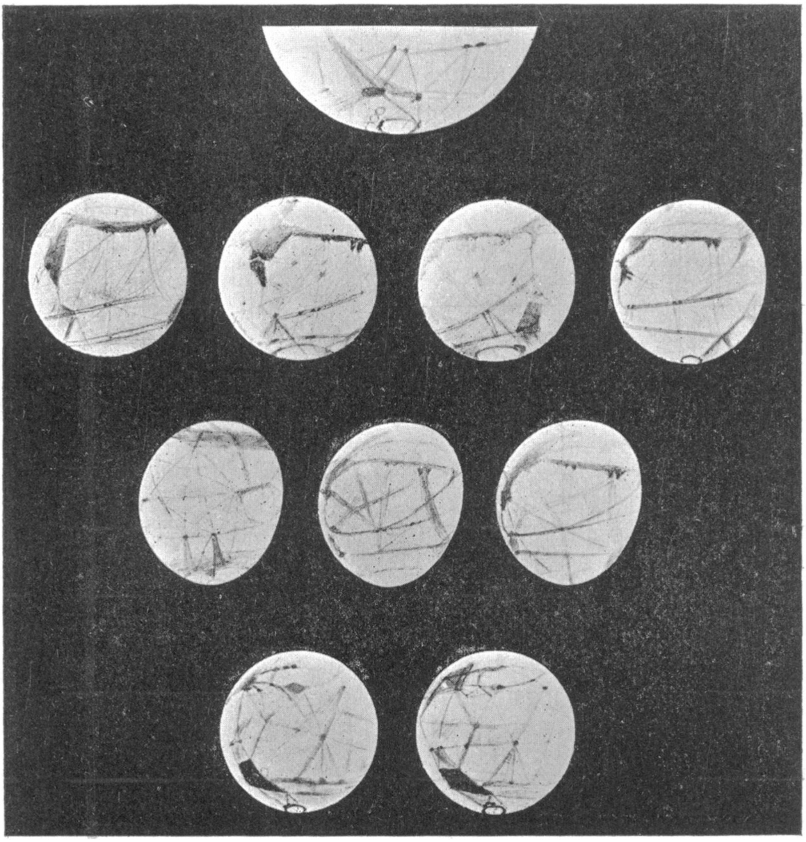
A similar rift to that in the drawing of March 9, 1916, was observed on February 15, 1918, with a period of slightly over a Martian year between the two observations. The effect of the later seasonal date can be observed in the diminished size of the polar cap. The positions of this second rift on the two dates do not correspond exactly, but this can be accounted for by the difficulty of positioning small detail or by the fact that there are many nearly parallel canals in this region, any one of which may have produced the effect observed.

In 1920, the north polar cap was at about its smallest on May 24. and the canal *Cadmus* was easily seen to extend northward to the cap along the position of the rift seen in the drawings of 1916. In the large drawing of the polar cap of May 27, 1920 (Martian date August 13) the *Cadmus* can be seen very well and there is another rift in the small remaining cap.

The action of this canal and the rift it seemingly makes in the polar cap corresponds to the observations made by Dr. Lowell and the inferences that he draws from them. He says:

> If there were strips of vegetation in the midst of the desert that underlies the polar cap, such vegetation would make its presence known by appearing as rifts in the snow-field. Such would be the case for the following reason. The life of plants has this in common with the life of animals, that their vital processes both generate heat. The fact was not recognized as true of plants until long after it was well known of animals. Indeed, the discovery that plants give out heat in growing is of comparatively recent detection.

Now the calorific action of vegetation on snow is very often observed on earth and we have seemingly had evidence of the same character upon Mars. If this be so, the two suspected materials—snow and vegetation—on the planet, vouch for each other. The



POLAR RIFTS ON MARS

May 27, 1920.
March 4, 1916. March 9, 1916. February 15, 1918. May 24, 1920.
July 8, 1920. August 2, 1920. August 3, 1920.
May 11, 1920. May 12, 1920.

snow, if it be snow, is melted as on earth by vegetation; and the vegetation, if it be vegetation, melts the snow as on earth.

Observations of this character again were made on August 2, 1920, and the following date, September 20, Martian calendar. One of the first northern snowfalls occurred near that time, and a canal was easily seen going north from the *Arethusa Lucus,* but was obliterated completely further north by the new-fallen snow. The drawing of the next day, August 3, shows that the snow has melted over the canal—as it would over vegetation—and that there is left a rift where the day before the cap showed an even contour, but on the following is made up of two lobes, one on each side of the now triumphant and still flourishing canal.

Before this date, a snowfall occurred north of the *Proponti,* and from the rift seen in the drawing of July 8, this snow must have fallen earlier even than this and melted over the canal that leaves the *Propontis* in a northerly direction towards the cap. This is an identical example of the phenomenon seen on August 3. It is also interesting in that it shows the depth of the new-fallen snow to be much thinner, as Dr. Lowell suggests, than the old winter cap itself; which can be seen dimly, together with its dark surrounding band, through the new covering of snow.

That the tiny northern cap itself was thin is evidenced in the drawings of May 11 and 12, 1920, where a slight rift is visible cutting the cap nearly in two. This is no doubt similar to the "Open Polar Sea" that Dr. Lowell talks of in referring to the small southern cap.

Detail on Mars is so complex, and the conclusions one can draw from the secular and seasonal changes so interesting, that when by careful scrutiny of the disk a marking of great interest is observed—it would be really better to devote one's attention to that area alone and draw it—rather than attempt a drawing of the whole disk. The marking itself would be swamped in a complete drawing, without regard to the attention taken from it by an endeavor to portray the rest of the surface features of the planet.

Mars has given to this world a most interesting and instructive line of research—I might almost say vital to the future welfare of the race on Earth.